FIG. IA

FIG. IB

FIG. IC

Baits	Prey	Reporter	Reporter Output		Logical Relationship
			X-Gal Glu / URA-Glu	X-Gal Gal / URA-Gal	
LexA-hSos1	B42-Ras B42	LexOp-LacZ			And
TetR-c-Raf1	B42-Ras B42	TetOp-URA3			
LexA-Max	B42-c-Raf1 B42-Mxi1	LexOp-LacZ			Ls1
TetR-RasV12	B42-c-Raf1 B42Mxi1	TetOp-URA3			Ls2
LexA-RasV12	B42-c-Raf1 B42-Cdc25	LexOp-LacZ			Ls1
TetR-RasA15	B42-c-Raf1 B42-Cdc25	TetOp-URA3			Ls2

FIG. 2
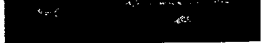
Cell	LacZ Output	β−Galactosidase Activity
1		22.6±3.3
2		7.4±1.0

FIG. 3A

Cell 1

Ras−GDP
LexA

Cdc25 ↓

Ras−GTP
LexA

■ B42
▢ c−Raf1
Ras−GTP
LexA
LexOp   LacZ

Cell 2

Ras−GDP
LexA

Gap ↑

Ras−GTP
LexA

■ B42
▢ c−Raf1
Ras−GTP
LexA
LexOp   LacZ
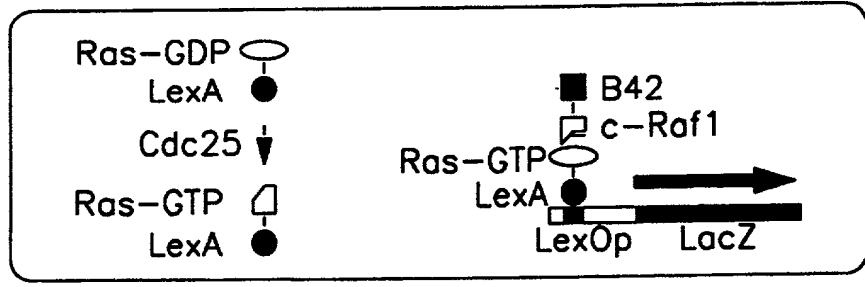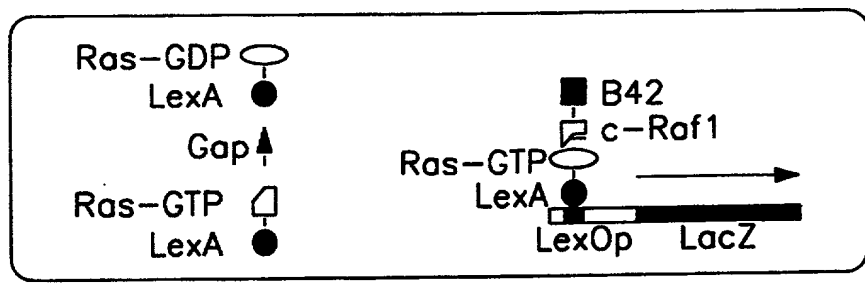
FIG. 3B

Input Values		LacZ Output
1(B42−c−Raf1)	0(GAP)	0
1(B42−c−Raf1)	1(Cdc25)	1

FIG. 3C

Logical Not

α factor = 0
TGF–β = 1
Input α–factor, output TGF–β
Input TGF–β, output α factor

α–factor receptor   TGF–β receptor

G.protein   LexA–Madd

| αRE | TGF–β |

| op | α–factor |
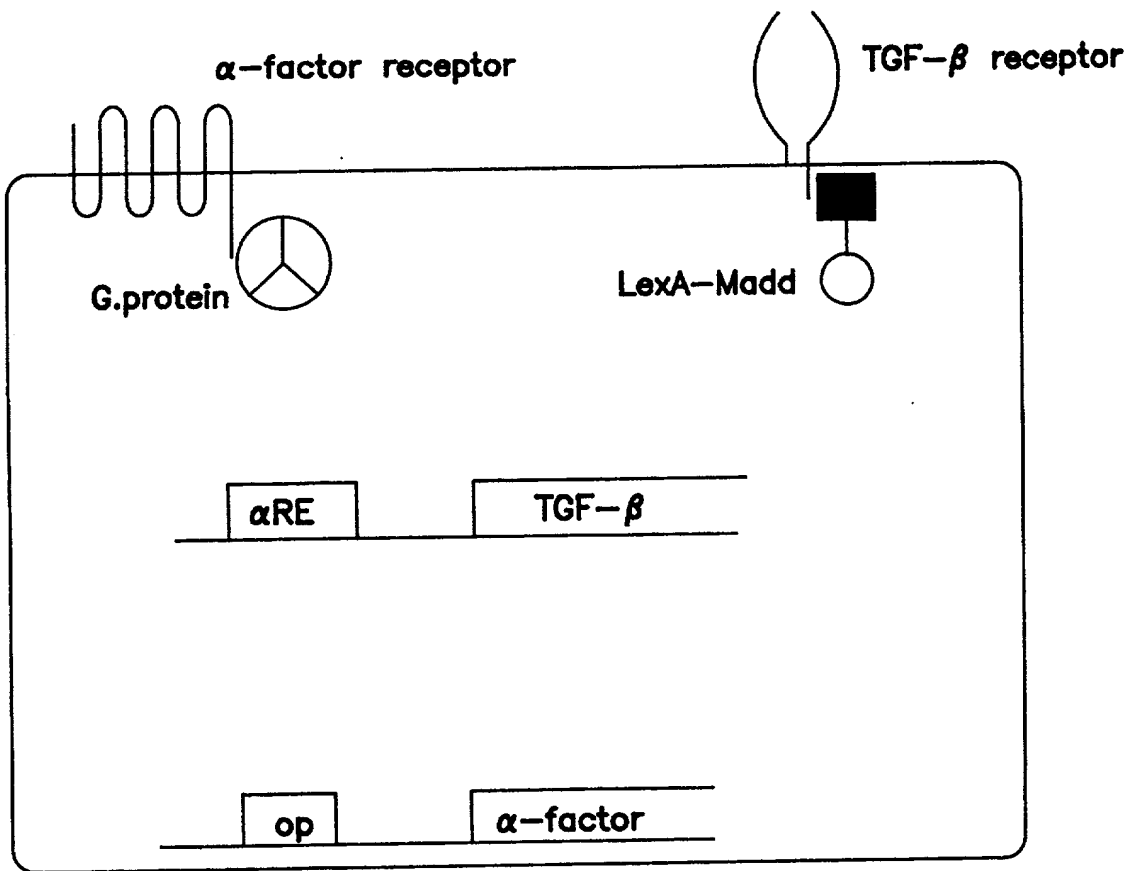
FIG. 4

Four input output channels

(variety of possible logical operations)

Inputs
α factor
TGF–β
Delta
Bradykinin

Receptors
α factor R
TGF–β R
Notch
Bradykinin R

α–factor receptor

TGF–β receptor

Notch

Bradykinin receptor

G.protein

LexA–Madd

Gal4–RBP–J$_\kappa$

Mammalian Gαq,β,γ, PKC

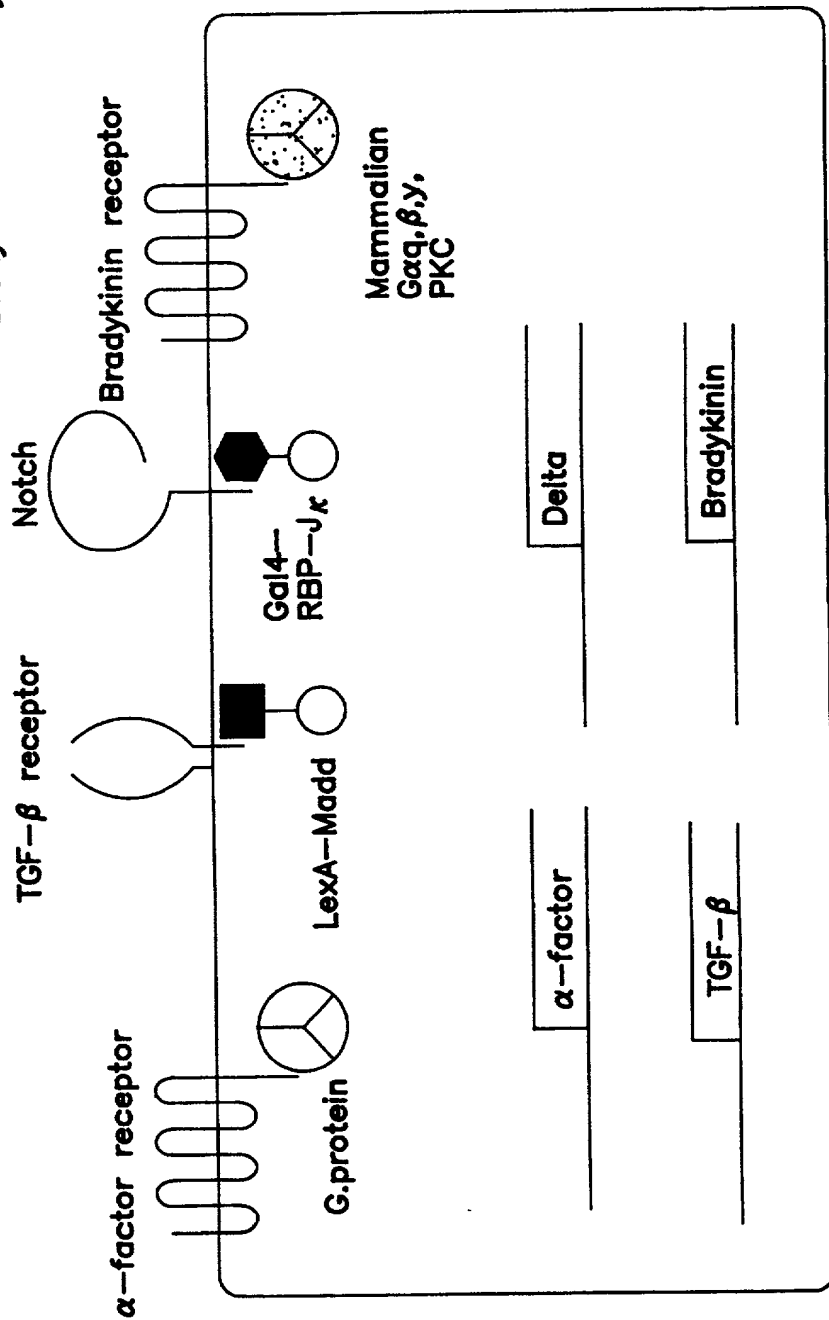α–factor

TGF–β

Delta

Bradykinin

FIG. 5

Fluorescence resonance energy transfer "transistor"

No green light input
HIV protease linker intact
Blue light input
Green light output

Green light input
Linker cleaved
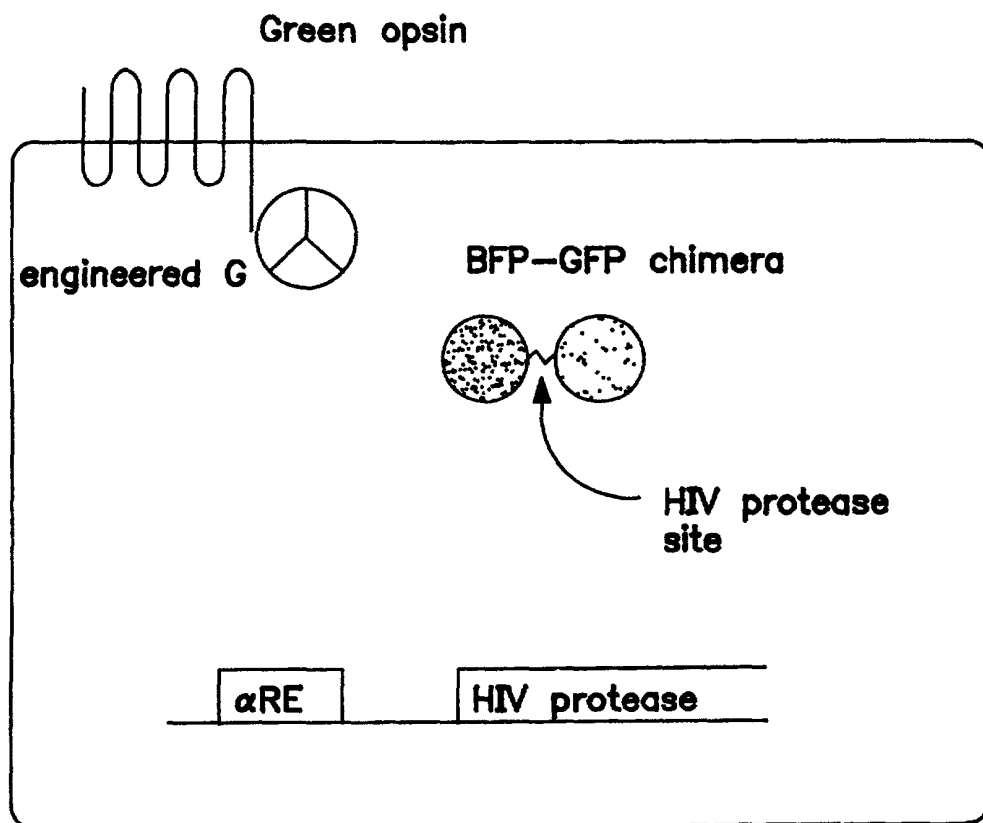Blue light input
No green fluorescence

Green opsin

engineered G

BFP—GFP chimera

HIV protease
site

αRE   HIV protease

FIG. 6